

This listing of claims will replace all prior versions, and listings, of claims in the application.

Listing of Claims:

1. (Previously Presented) An apparatus being adapted to receive and open a container having a mechanically openable door, comprising:

a frame including:

a first elongated structural member and a second elongated structural member, said first and second elongated structural members each having a front face, a rear face, a top portion and a bottom portion;

a structure secured to said bottom portion of said first and second elongated structural members, said structure having an exterior surface partially covering said front face of said first and second elongated structural members, an interior surface partially covering said rear face of said first and second elongated structural members;

a port door storage area located between said first and second elongated structural members, said exterior surface and said interior surface;

a container support assembly secured to said frame;

an isolation plate, having an opening, mounted to said first and second elongated struts; and

a port door movable between said opening in said isolation plate and said port door storage area.

2-3. (Canceled)

4. (Previously Presented) The apparatus as recited in claim 1, wherein said isolation plate may be removed from said frame without having to first remove said container support assembly.

5-7. (Canceled)

8. (Previously Presented) An apparatus able to receive and open a container having a mechanically openable door, comprising:

a frame including:

a first elongated structural member and a second elongated structural member, said first and second elongated structural members each having a first end and a second end; and

a support mounted to said second ends of said first and second elongated structural members;

a port door storage area;

a container support assembly secured to said frame;

an isolation plate detachably secured to said first and second elongated structural members, said isolation plate having an opening located at an elevation between said first and second ends of said first and second elongated structural members; and

a port door movable between said opening in said isolation plate and said port door storage area.

9. (Currently Amended) The apparatus as recited in claim 8, further including a port door drive mechanism substantially enclosed in a port door drive mechanism housing secured to said frame, said port door drive mechanism for moving said port door between said opening and said port door storage area.

10. (Previously Presented) The apparatus as recited in claim 8, wherein said container support assembly is adapted to control the position of a container seated on said container support assembly.

11-17. (Canceled)

18. (Previously Presented) A workpiece handling tool for accessing workpieces stored in a container, comprising:

a frame having an upper support and a lower support, said lower support including a port door storage area;

a load port assembly secured to said frame;

an isolation plate mounted to said frame, said isolation plate having an opening located at an elevation between said upper support and said lower support;

a port door movable between said opening in said isolation plate and said port door storage area; and

a workpiece engine for accessing the workpieces stored in the container through said opening in said isolation plate.

19. (Previously Presented) The tool as recited in claim 18, wherein at least one surface of said upper support or said lower support comprises a perforated surface.

20. (Previously Presented) The tool as recited in claim 18, wherein said isolation plate may be removed from said frame without having to first remove said load port assembly or said workpiece engine.

21. (Previously Presented) The tool as recited in claim 18, wherein said lower support comprises a single piece of material.

22. (Currently Amended) The tool as recited in claim 18, wherein said load port assembly includes a container support, whereby a workpiece stored in an upper shelf of a container seated on said container support defines a first horizontal plane and a workpiece stored in a lower shelf of a container seat seated on said container support defines a second horizontal plane.

23. (Previously Presented) The tool as recited in claim 22, wherein said workpiece engine comprises:

means for moving an end effector between a retracted position and an extended position;
an elevator having a vertical drive column, said elevator for vertically moving said means for moving an end effector between a retracted position and an extended position;
and
said vertical drive column passing through at least said first horizontal plane or said second horizontal plane.

24. (Previously Presented) The apparatus as recited in claim 1, wherein said structure comprises a single piece of material.

25. (Previously Presented) The apparatus as recited in claim 1, further including a workpiece engine for accessing workpieces stored in the container through said opening in said isolation plate.

26. (Currently Amended) The apparatus as recited in claim 25, wherein said workpiece engine comprises:

an end effector;
means for moving said end effector between a retracted position and an extended position; and
an elevator having a vertical drive housing substantially enclosing a vertical drive mechanism for raising and lowering said means for moving said end effector between a retracted position and an extended position.

27. (Currently Amended) The apparatus as recited in claim 26, wherein said vertical drive housing of said workpiece engine occupies a vertical elevation range in a clean environment substantially equal to the vertical elevation range said opening occupies in said isolation plate.

28. (Currently Amended) The apparatus as recited in claim 1, further including a port door drive mechanism housing mounted to at least one of said first and second elongated structural members, said port door drive mechanism housing substantially enclosing a drive mechanism for moving said port door between said opening in said isolation plate and said port door storage area.

29. (Currently Amended) The apparatus as recited in claim 28, wherein said port door drive mechanism housing includes a slot for air flow.

30. (Currently Amended) A workpiece handling tool for accessing workpieces stored in a container seated on a container support, whereby a first horizontal plane is defined by the elevation of a workpiece stored in a top shelf of the seated container and a second horizontal plane is defined by the elevation of a workpiece stored in a bottom shelf of the seated container, comprising:

a frame;

a load port, including:

an isolation plate mounted to said frame, said isolation plate having an opening;

a port door;

a port door drive mechanism for moving said port door between an open position and a closed position, said port door drive mechanism substantially enclosed in a port door drive mechanism housing passing through at least said first horizontal plane or said second horizontal plane; and

a workpiece engine, including:

an end effector;

means for moving said end effector between a retracted position and an extended position; and

an elevator having a vertical drive housing substantially enclosing a vertical drive mechanism for raising and lowering said means for moving said end effector between a retracted position and an extended position, said

vertical drive housing passing through at least said first horizontal plane or said second horizontal plane.

31. (Currently Amended) The tool as recited in claim 30, wherein said port door drive mechanism housing is mounted to said frame.

32. (Previously Presented) The tool as recited in claim 30, wherein said frame further includes a port door storage area.

33. (Previously Presented) The tool as recited in claim 30, wherein said isolation plate may be removed from said frame without having to first remove the container support or said workpiece engine.

34. (Currently Amended) A workpiece handling tool for accessing workpieces stored in a container seated on a container support, whereby a first horizontal plane is defined by the elevation of a workpiece stored in a top shelf of the seated container and a second horizontal plane is defined by the elevation of a workpiece stored in a bottom shelf of the seated container, comprising:

a frame;

an isolation plate mounted to said frame, said isolation plate having an opening;

a port door; and

a port door drive mechanism for moving said port door between an open position and a closed position, said port door drive mechanism substantially enclosed in a port door drive mechanism housing that passes through at least said first horizontal plane or said second horizontal plane.

35. (Currently Amended) The tool as recited in claim 34, further including a workpiece engine comprising:

an end effector;

means for moving said end effector between a retracted position and an extended position; and

an elevator having a vertical drive housing substantially enclosing a drive mechanism for raising and lowering said means for moving said end effector between a retracted

position and an extended position, said vertical drive housing passing through at least said first horizontal plane or said second horizontal plane.

36. (Currently Amended) The tool as recited in claim 34, wherein said port door drive mechanism housing is mounted to said frame.

37. (Previously Presented) The tool as recited in claim 34, wherein said frame includes a port door storage area.

38. (Previously Presented) The tool as recited in claim 37, wherein said port door drive mechanism moves said port door between said opening in said isolation plate and said port door storage area.

39. (Previously Presented) The apparatus as recited in claim 1, wherein said port door is adapted to couple with the mechanically openable door of the container.

40. (Previously Presented) The apparatus as recited in claim 1, wherein said container support provides position control of a container seated on said container support.

41. (Previously Presented) The apparatus as recited in claim 8, wherein said port door is adapted to couple with the mechanically openable door of the container.

42. (Currently Amended) The tool as recited in claim 18, wherein said load port assembly includes a container support.

43. (Previously Presented) The tool as recited in claim 42, wherein said container support controls the position of a container seated on said container support.

44. (Currently Amended) A workpiece handling tool for accessing workpieces stored in a container seated on a container support, whereby a first horizontal plane is defined by the elevation of a workpiece stored in a top shelf of the seated container and a second horizontal plane is defined by the elevation of a workpiece stored in a bottom shelf of the seated container, comprising:

a frame;

an isolation plate mounted to said frame, said isolation plate having an opening;

a port door; and

a workpiece engine, comprising:

an end effector;

means for moving said end effector between a retracted position and an extended position; and

an elevator having a vertical drive housing substantially enclosing a drive mechanism for raising and lowering said means for moving said end effector between a retracted position and an extended position, said vertical drive housing passing through at least said first horizontal plane or said second horizontal plane.

45. (Previously Presented) The tool as recited in claim 44, further including a port door drive mechanism for moving said port door between an open position and a closed position.

46. (Currently Amended) The tool as recited in claim 45, wherein said port door drive mechanism is substantially enclosed in a port door drive mechanism housing that passes through at least said first horizontal plane or said second horizontal plane.

47. (Currently Amended) The tool as recited in claim 46, wherein said port door drive mechanism housing contains an air-flow slot.

48. (Previously Presented) The tool as recited in claim 44, wherein said port door is adapted to couple with a door of the container.

49. (Previously Presented) The tool as recited in claim 44, wherein said frame includes a port door storage area.

50. (Previously Presented) The tool as recited in claim 44, wherein said workpiece engine accesses the workpieces stored in the seated container through said opening in said isolation plate.